# NEWS RELEASE

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
1520 H STREET, NORTHWEST · WASHINGTON 25, D. C.
TELEPHONES: DUDLEY 2-6325 · EXECUTIVE 3-3260

FOR RELEASE: UPON DELIVERY

No. 61-124


Commencement Address

by

James E. Webb, Administrator

National Aeronautics and Space Administration

George Washington University

June 7, 1961

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President Carroll, Distinguished Trustees, Learned Faculty, Graduates, Families, Friends:

I deeply appreciate the honor that George Washington University has conferred on me tonight. As a student who found here in the Night Law School during the 'thirties encouragement, opportunity, and learning, and as a Trustee who found here in the 'fifties an opportunity for service, I have an abiding appreciation and love for George Washington. This action by the University means more than I can say.

Thirty-five years ago, in March 1926, the father of American rocketry, Dr. Robert H. Goddard, converted an early study and interest in rockets into a successful flight. His rocket -- fueled with gasoline and liquid oxygen -- rose only 41 feet, traveled a grand total of 184 feet, and seemed to offer no more promise than did the first flight of the Wright Brothers. And yet, both flights ushered in new epochs in man's mastery of the earth's atmosphere and of the space beyond.

Forty years from tonight, you who are graduating here, will be among the first and most experienced citizens to carry on your 20th century careers into the twenty-first century. What changes will occur in that time? In some of the physical sciences, our knowledge doubles every ten years. We live in an environment of momentous change, of a driving, restless, insatiable search for new knowledge.

In fifty-eight years we have come from the fragile plane of the Wright Brothers, through the lone-eagle flight of Lindbergh, to swift, routine air travel which permits the President of the United States to meet with the Premier of the U.S.S.R. in Vienna on Sunday, stop to see the Prime Minister in London on Monday, and be back in the capital of his own country on Tuesday morning.

In the three and a half decades since Goddard launched his primitive rocket, we have seen in the U.S. the development of a combined rocket and aeronautical capability that permits test pilot Joe Walker in the NASA X-15 to jab forty miles up into space and return to the earth's atmosphere repeatedly, achieving speeds above 3,000 miles per hour and landing back at his home base. Most of the rocket development has taken less than a decade. We have seen in less than eight years the development of a rocket that could boost Astronaut Shepard into space 115 miles above the earth, to learn what it means to experience that state of weightlessness which is unachievable on the earth's surface. At an accelerating pace during the past three and one-half years, the United States has launched 39 satellites and four deep space probes. Twenty-four of our satellites are still in orbits around the earth and two of the probes are in orbits around the sun. Nine of the satellites are still transmitting useful information.

As an example of how our space program works, on March 11, 1960, NASA launched a deep space probe, called Pioneer V, to gather scientific data and to test communications over interplanetary distances. Pioneer V weighed 94 pounds and contained two radio transmitters and receivers, plus instruments to measure radiation streaming from the sun, the spatial distribution of energetic particles and medium-energy electrons and protons, the number and density of meteoric dust particles striking the probe, and the strength of magnetic fields.

We communicated with Pioneer V for a distance of 22 million miles, and through it confirmed the existence of an electrical ring current circling the earth at an altitude of 40,000 miles, about which geophysicists had been speculating for more than 50 years.

Pioneer V also measured an intense zone of disturbed magnetic fields at distances of 40,000 to 60,000 miles from the earth; revealed that the boundary of the earth's magnetic field is twice as far from earth as had been previously supposed; and reported the first direct observation of pure cosmic rays at altitudes completely free of the earth's atmosphere. This observation was made three million miles in space.

I could list many other examples, such as the discovery of the Van Allen Radiation Belts, or the fact that our first weather satellite, TIROS I, completed more than 1,300 orbits of the earth and transmitted more than 22,000 pictures before we lost communication with it. A large number of these proved of great value in increasing our knowledge of weather phenomena.

I could go on to mention Echo I, NASA's brightly twinkling earth-orbiting balloon, seen by millions of observers around the world, which has proved the feasibility of using satellites to reflect radio and other signals. Put up with a life expectancy of three months, it has already lasted a year. It is showing wrinkles, and we suspect it has been punctured by many micrometeorites. If we could get it back, it would answer many questions about conditions in space.

The U.S. space effort has made tremendous progress since man fired into orbit the first artificial earth satellites three and one-half years ago. I believe it is fair to say that during this period the United States has achieved first position in space science and technology, and has fully merited the confidence of the world scientific community.

All of this began in the second quarter of the 20th century, with the determination and spirit of Dr. Goddard, best expressed in his own words which were: "It is difficult to say what is impossible, for the dream of yesterday is the hope of today and the reality of tomorrow."

Perhaps in this third quarter of this century I may be permitted to ask tonight whether your dream of yesterday on entering the George Washington University, is your hope for today as you graduate, and whether you are prepared to accept it as the reality of the 21st century. If so, I suggest that the feeble rocket that first flew for Dr. Goddard 35 years ago is growing up, and before this quarter is over, will become the gigantic Nova booster which will be as large at its base as the Washington Monument, will stand two-thirds the height of that imposing shaft, and with a thrust of 12 million pounds will rocket three men to the moon and have enough additional power to return them to earth.

I suggest also that you consider the estimate, made in last Sunday's New York Times, of an annual revenue from a space communications satellite system which might reach the $100 billion mark long before the year 2001. I have not seen the information on which the writer based his forecast. It may be too optimistic, but it does equal the amount we as a nation now spend each year for all forms of transportation -- air, land, water, bus, automobile, subway, truck, and train. Last year, this was one-fifth our gross national product.

The availability of such a global system will reduce communication costs, improve service, greatly increase the ones which can be served, and bring immense benefits to industry. According to Dr. Lloyd V. Berkner, Chairman of the Space Science Board of the National Academy of Sciences, "...Satellites can multiply the quantity of long distance communications by a factor of perhaps 10,000."

As you ponder these facts, I suggest that you dream no little dreams, or Dr. Goddard's reality will leave you far behind long before the 21st century.

Before the third quarter of this century ends, the planning, the preparation for, and the landing of a three-man team on the moon will become a vast enterprise involving a large part of U.S. science and technology. It will add zest and stimulation to almost every level of education, industry, government, and to life in general. It may provide a powerful focus for the need of all mankind to participate cooperatively in space research and exploration. Even at our present rate of progress in space, we are developing a science and technology whose powerful influence will be increasingly felt throughout our country and the world.

This science and technology will almost certainly differ from what might have come into being without the drive and integrating force of a major space effort. Further, the goal of mastering space is essential insurance against arriving at some point with a technology inferior to that of the Soviet Union which will undoubtedly continue pushing forward along the space frontier. It is also insurance against military use being made of the new technology to jeopardize our security.

I am convinced that this country could not stay out of space technology under any circumstances, any more than we could have remained aloof from aviation if someone in another country had flown before the Wright Brothers.

President Kennedy has determined that an important key to our future position lies in going beyond the Mercury one-man spacecraft in which Astronaut Shepard made his flight. The President feels we have the ability and we must move on to giant boosters, powering larger craft with crews of several men on long voyages to explore deep space, the moon, and the planets.

Not all the effects of the national space program will be confined to space itself, even in the earliest years. Of great importance is the impression our space effort will make on the minds of men around the world.

Today prestige is one of the most important elements of international relations. It is a complex of old principles and new concepts, and its scope has broadened immensely. Essential to our prestige today is the belief of other nations that we have capability and determination to carry out whatever we declare seriously that we intend to do. There is no denying that in the eyes of the world, during the past few years, our capability and determination have been brought into serious question. In the minds of millions, dramatic space achievements have become today's symbol of tomorrow's scientific and technical supremacy. There is without a doubt a tendency to equate space and the future. Therefore, space is one of the fronts upon which President Kennedy and his Administration have chosen to act broadly, vigorously, and with continuous purpose. In no field can we gain more of what we need abroad and at the same time achieve such a wealth of practical and useful results at home.

It may seem hard to believe, but I am prepared to assert categorically that you as a citizen, as a future parent, as a patient in a hospital, will benefit from space exploration in your daily life. It will open up new opportunities for service and profit. The kind of job you get and your pay for it will be better.

Already our push into space has produced a ceramic that is made into pots and pans that can be moved from the coldest freezer into the hottest flame without damage. Our study of foods most suitable for space flight will lead to improved nutrition for the earthbound. Space research has created new materials, metals, alloys, fabrics, compounds, which already have gone into commercial production. From our work in space vacuum and extreme temperatures have come new durable, unbreakable plastics that will have a wide variety of uses, such as superior plumbing and new types of window glass that will filter intense light. Our scientists have devised minute instruments called sensors to gauge an astronaut's physical responses in space, to measure his heartbeat, brain waves, blood pressure, and breathing rate. In the future these same devices could be attached to hospital patients so that they could be watched by remote control, and their condition recorded continuously and automatically at the desk of a head nurse.

Beginning with World War II, science and technology were harnessed to large-scale organized effort. In the postwar period the expansion of the nation's research and development has reached a point where the total dollars invested by government, by industry, and by universities is at a level of about $14 billion a year. This is the base from which our new space effort now takes off, and it is the same base from which our most successful industries supply our newest needs.

Perhaps the truest lesson we have learned since World War II is that dollars invested in research and development are high-powered dollars -- they produce better answers to our problems, better things for our use, and better jobs in growth industries. This will be equally true of the research dollars we spend in space.

And let me point out here that by no means do men have a monopoly on careers in space. Ann E. Bailie, a gifted young

NASA scientist, made important contributions to the recent investigation which revealed that the earth is shaped more like a pear than a bulging sphere. Dr. Nancy Roman is chief of NASA's Astronomy and Astrophysics Satellite and Sounding Rocket Programs and Eleanor C. Pressly is head of the Vehicle Section of the Space Sciences Division at Goddard Space Flight Center.

To grasp the speed and dimensions of man's surge into the Space Age, consider this: It is estimated that about nine-tenths of all men and women ever trained in science and technology are alive today. This is true in other nations, as well as our own.

As a nation, we cannot escape the fact that, regardless of how we got there and regardless of whether we like it or not, we are in competition with the Soviet Union to prove the merits of our social, economic, and political system.

We dare not lose this contest, and I want to state my conviction that we shall not lose it.

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